



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,151	06/27/2003	Christopher F. Robinson	FIS920030069	1150
23550	7590	10/06/2005	EXAMINER	
HOFFMAN WARNICK & D'ALESSANDRO, LLC			STOCK JR, GORDON J	
75 STATE STREET			ART UNIT	
14TH FL			PAPER NUMBER	
ALBANY, NY 12207			2877	

DATE MAILED: 10/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. K	Applicant(s)	
	10/604,151	ROBINSON, CHRISTOPHER F.	
	Examiner	Art Unit	
	Gordon J. Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-14 is/are allowed.
- 6) ☒ Claim(s) 1-9 and 15-18 is/are rejected.
- 7) ☒ Claim(s) 19 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claims 1-9** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. As for **claim 1**, the limitation “such that substantially all of a vertical area of the test pattern intersects at least one horizontal line pattern and substantially all of a horizontal area of the test pattern intersects at least one vertical line pattern” was not reasonably conveyed, for the disclosure only describes partial intersecting of the horizontal area of the test pattern, a top side and bottom side, with vertical lines and partial intersecting of the vertical area of the test pattern, a left side and right side, with horizontal lines (as described in Fig. 10). **Claims 2-9** are rejected for being depended upon a rejected base claim.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-9** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As for **claim 1**, the limitation “such that substantially all of a vertical area of the test pattern intersects at least one horizontal line pattern and substantially all of a horizontal area of the test pattern intersects at least one vertical line pattern” is indefinite, for it is unclear as to what encompasses “substantially all of a vertical area of the test pattern” and “substantially all of a horizontal area of the test pattern,” the whole pattern since all patterns comprise two directions horizontal and vertical or partial areas that are horizontal and vertical and if these areas are partial areas what differentiates the horizontal areas from vertical areas since partial areas also comprise horizontal and vertical directions. **Claims 2-9** are rejected for depending upon a rejected base claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1-4, and 6** are rejected under 35 U.S.C. 102(e) as being anticipated by **Schulz (6,765,282)**.

As for **claim 1**, Schulz in a method for determining critical dimensions discloses the following: a test pattern comprising: feature patterns (Fig. 2: 213, 214); horizontal line patterns (Fig. 2: 204); vertical line patterns (Fig. 2: 204); the features patterns are interleaved with the horizontal line patterns and vertical line patterns (Fig. 2: 213, 214, 204); and are a plurality due to a plurality of elementary cells (Fig. 1a: 100; 106); wherein the test pattern image is exposed on

Art Unit: 2877

a resist coated substrate (col. 1, lines 20-30; col. 7, lines 45-65); analyzing the test pattern image to evaluate the lithography tool resolution, by evaluating critical dimension (col. 3, lines 4-30; col. 2, lines 5-10). As for substantially all of a vertical area of the test pattern intersects at least one horizontal line pattern, Schulz demonstrates the test pattern's vertical sides intersecting horizontal lines (Fig. 2: vertical sides of 205 intersecting 204) and a horizontal area of the test pattern overlapping a vertical line (Fig. 2: 205's central region comprising vertical and horizontal regions underlying 204).

As for **claims 2, 3, 4, 6**, Schulz discloses everything as above (see **claim 1**). In addition, he discloses at least four feature patterns located at the center of the test pattern for four elementary cells are located in the center of the test pattern (Fig. 1a: 100, 106; Fig. 2: 213, 214); each corner of the test pattern includes a feature pattern for the test pattern has four corner elementary cells (Fig. 1a: 100, 106; Fig. 2: 213, 214); and each midpoint of each radius of the test pattern includes a feature pattern (Fig. 2: the vertical component of 204's midpoint includes 213; the horizontal component of 204's midpoint includes 214); and the test pattern has a plurality of rows and columns comprising a set of at least 16 elementary cells with a horizontal pattern and vertical pattern located in both rows and columns (Fig. 1a; Fig. 2: 204).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claims 15-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Schulz (6,765,282)**.

As for **claim 15**, Schulz in a method for determining critical dimensions discloses the following: a test pattern comprising: feature patterns (Fig. 2: 213, 214); horizontal line patterns (Fig. 2: 204); vertical line patterns (Fig. 2: 204); the features patterns are interleaved with the horizontal line patterns and vertical line patterns (Fig. 2: 213, 214, 204); and are a plurality due to a plurality of elementary cells (Fig. 1a: 100; 106); wherein the test pattern image is exposed on a resist coated substrate (col. 1, lines 20-30; col. 7, lines 45-65); analyzing the test pattern image to evaluate the lithography tool resolution, by evaluating critical dimension (col. 3, lines 4-30; col. 2, lines 5-10). As for the feature pattern including a plurality of sub-patterns, Schulz doesn't explicitly state this, but he discloses a periodic feature pattern comprising two shapes (Fig. 2: 213, 214). Therefore, it would be obvious to one skilled in the art at the time the invention was made that the feature pattern comprised a plurality of subpatterns because the periodic feature pattern comprised a plurality of periodic shapes.

As for **claim 16**, Schulz discloses everything as above (see **claim 15**). And discloses multiple exposure steps, photolithographic steps (col. 7, lines 50-60). He is silent concerning varying the exposure times but implies varying exposure times by teaching imperfect overlay between layers due to temperature differences between times of exposure. And that the patterns are different with differing materials (Fig. 2a). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the additional exposure step for another pattern layer having a different exposure time due to the different material and process

Art Unit: 2877

characteristics of the differing patterns and to compensate for temperature variations between exposures.

9. **Claims 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Schulz (6,765,282)** in view of **Lin et al. (5,847,818)**.

As for **claims 17-18**, Schulz discloses everything as above (see **claim 15**). And discloses measuring critical dimension of the pattern (col. 5, lines 9-20; col. 7, lines 60-67). He is silent concerning using a microscope. However, Lin in a CD measurement apparatus teaches using a scanning electron microscope to measure CD's in the deep submicron field (col. 1, lines 10-20). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to use a SEM microscope in order to measure increasingly smaller features on a wafer such as features in the deep submicron field. And he discloses adjusting the lithography tool resolution based on the CD measurements improving numerical aperture, depth of focus, and wavelength of light of the lithography tool (col. 1, lines 35-45).

Allowable Subject Matter

10. **Claims 10-14** are allowed.

Claims 19-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 5, 7-9 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph and 1st paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Art Unit: 2877

As to **claim 5**, the prior art of record, taken alone or in combination, fails to disclose or render obvious a test pattern a midpoint of each side of the test pattern includes a feature pattern, in combination with the rest of the limitations of **claim 5**.

As to **claim 7**, the prior art of record, taken alone or in combination, fails to disclose or render obvious a test pattern wherein the line width and the space width for the plurality of sets of lines varies from less than a nominal resolution limit of a lithography tool to greater than the nominal resolution limit, in combination with the rest of the limitations of **claim 7**.

As to **claim 8**, the prior art of record, taken alone or in combination, fails to disclose or render obvious a test pattern a plurality of sets of positive tone holes and negative tone holes, in combination with the rest of the limitations of **claim 8**.

As to **claim 9**, the prior art of record, taken alone or in combination, fails to disclose or render obvious a test pattern a set of isolated lines; a set of isolated spaces; a set of finger arrays; and a set of contact holes, in combination with the rest of the limitations of **claim 9**.

As to **claim 10**, the prior art of record, taken alone or in combination, fails to disclose or render obvious a test pattern wherein each sub-pattern includes at least one feature size that varies in size from less than a nominal resolution limit of a lithography tool to greater than the nominal resolution limit in combination with the rest of the limitations of **claims 10-19**.

As to **claim 19**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method of evaluating a lithography tool resolution the feature patterns are located in a midpoint of each radius of the test pattern image, in combination with the rest of the limitations of **claim 19**.

As to **claim 20**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method of evaluating a lithography tool resolution wherein each feature pattern includes a plurality of sub-patterns that include: a plurality of sets of positive tone holes; and a plurality of sets of negative tone holes, in combination with the rest of the limitations of **claim 20**.

Response to Arguments

11. Applicant's arguments filed July 21, 2005 in regards to claims 1 and 15 have been fully considered but they are not persuasive. Specifically, for **claim 1** that Schulz does not teach "such that substantially all of a vertical area of the test pattern intersects at least one horizontal line pattern and substantially all of a horizontal area of the test pattern intersects at least one vertical line pattern" Examiner disagrees for Schulz demonstrates the test pattern's vertical sides intersecting horizontal lines (Fig. 2: vertical sides of 205 intersecting 204) and a horizontal area of the test pattern overlapping a vertical line (Fig. 2: 205's central region comprising vertical and horizontal regions underlying 204). As **claim 15** that Schulz does not teach a plurality of subpatterns, Examiner disagrees for Schulz doesn't explicitly state this, but he discloses a periodic feature pattern comprising two shapes (Fig. 2: 213, 214). Therefore, it would be obvious to one skilled in the art at the time the invention was made that the feature pattern comprised a plurality of subpatterns because the periodic feature pattern comprised a plurality of periodic shapes.

As for the arguments in regards to **claim 10**, Examiner has found them persuasive; therefore, due to the arguments' persuasiveness and due to the amendment of the claims the rejections of **claims 10 and 13** under 35 U.S.C. 103(a) has been withdrawn.

Art Unit: 2877

As for the rejection of **claim 4** that had allowable subject matter cited in the previous action, Examiner apologizes for the inconvenience but upon further consideration of Schulz a rejection was made.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 2004/0165194 to Hansen (specifically, Fig. 4).

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Art Unit: 2877

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs

October 3, 2005



Layla Lauchman
Primary Examiner
Art Unit 2877